AF/3725

Attorney Docket: 381AS/50328
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Hidetoshi NISHI et al.

Serial No.: 09/942,039 Examiner: J. Goetz

Filed: August 30, 2001 Art Unit: 3725

Title: ROLLING METHOD FOR STRIP ROLLING MILL AND STRIP ROLLING EQUIPMENT

RESPONSE

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Response is filed following the personal interview conducted on February 12, 2004, and responds to the final Office Action dated November 18, 2003 (Paper No. 18).

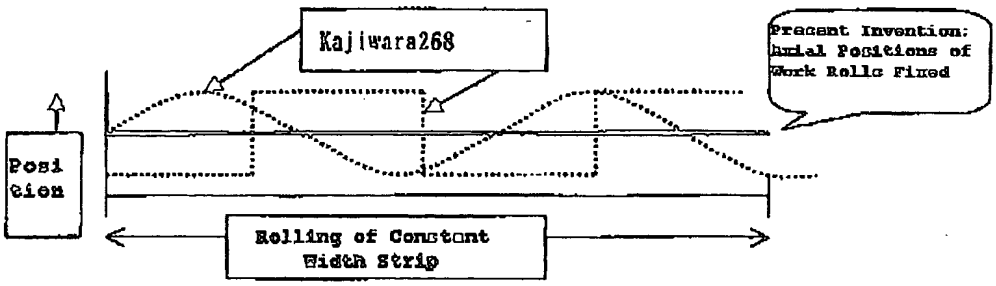
Claims 1, 2, 4-9, and 11-21 remain in this application. Claims 3 and 10 were previously canceled. Reconsideration of the application is requested.

Applicant's representative wishes to thank Examiner Goetz for the courtesy extended during the personal interview conducted on February 12, 2004. A separate record of the substance of the interview is included in the remarks which follow.

Independent claims 1, 9, and 14-20 are again rejected as being unpatentable over U.S. Patent 5,622,073 to Hiruta et al. in view of U.S. Patent 3,857,268 to

Kajiwaka. Independent claims 6 and 21 are again rejected as being unpatentable over the Hiruta et al. and Kajiwaka patents, and further in view of U.S. Patent 6,286,354 B1 to Kajiwara et al. Reconsideration of these rejections is requested.

According to the present invention, the work rolls are set at fixed axial positions and are not axially moved while a strip of material with a constant width is being rolled. The Kajiwaka work rolls, by contrast, are shifted axially during rolling any type of strip. The following diagram schematically contrasts the Kajiwaka work roll behavior during rolling with that of the work rolls of the present invention.



As noted during the interview, the Kajiwaka patent teaches rolling while cyclically shifting work rolls in axial directions within a predetermined range rather than fixing axial work roll positions during rolling. Attention is directed to lines 44-52 in column 2 and lines 28-36 in column 5 of the Kajiwaka patent. At most, the Kajiwaka disclosure teaches shifting working rolls 6 and 7 axially when a strip of material with a varying width is being rolled; the Kajiwaka patent does not teach setting the work rolls at fixed axial positions so that the work rolls are not axially

moved while a strip of material with a constant width is being rolled as each independent claim of the present application requires. The rationale relied on by the Examiner to "add the steps of fixing the axial positions of the [Hiruta et al.] work rolls during rolling and shifting the axial positions of the work rolls based [on] differing widths of subsequently rolled material" is simply not suggested by the Kajiwaka patent disclosure.

Figure 1 of the Kajiwaka patent illustrates a configuration in which each work roll has an end which is angled rather than tapered and is situated with its angled end coinciding with an end of a strip. If the work rolls are fixed at this position, when the strip end comes out of the work roll, due, for example, to lateral or side slip of the strip, it will not be possible to roll the strip. Thus, it is understood by one of ordinary skill in the art that the work rolls cannot be fixed in the position shown in Figure 1 of the Kajiwaka patent. Figure 2 of the Kajiwaka patent discloses a situation in which each work roll has the same angled end referred to above, but which is situated with its angled end axially deviating from and outside of strip ends. The Kajiwaka rolling mill, however, is intended to form a particular wear profile on the work rolls, and if the work rolls are fixed at the positions represented in Figure 2, the desired wear profile cannot be achieved. As discussed during the interview, it is understood by one of ordinary skill in the art that the Kajiwaka work rolls are shifted during rolling.

Figure 3 of the Kajiwaka patent is a schematic illustration used to explain how a wear profile is formed on a work roll. Wear profiles which are actually

formed on the work rolls are smooth, with curvatures as illustrated in Figures 1 and 2 of the Kajiwaka patent, since the work rolls are in fact cyclically shifted during rolling. In any event, while the Kajiwaka disclosure teaches shifting working rolls 6 and 7 axially when a strip of material with a varying width is being rolled, it does not teach setting the work rolls at fixed axial positions so that the work rolls are not axially moved while the strip of material with a constant width is being rolled. Again, therefore, the rationale relied on by the Examiner for fixing the axial positions of the Hiruta et al. work rolls in the manner proposed is simply not suggested by the Kajiwaka patent disclosure.

Each independent claim of the present invention further requires the work roll axial positions to be fixed such that points at which the tapered portions of the work rolls start come within the width of the strip of material. The tapered portions 33 of the Kajiwaka working rolls are not within the width of material strips 10. Thus, even if it is assumed that the rationale provided by the Examiner is proper, and that it would have been obvious to add steps of fixing axial positions "as suggested by Kajiwaka '268," those axial positions would not be fixed such that points at which tapered portions of work rolls start come within a width of a strip of material being rolled as defined by the independent claims of this application.

Each of independent claims 1, 9, and 14-20 is patentable for reasons discussed during the interview and reiterated above. Dependent claims 2, 4, 5, 7, 8, and 11-13 are also patentable. The Kajiwara et al. patent, relied on by the Examiner, which discloses a reversing type mill, also fails to suggest the limitations

discussed above, and claims 6 and 21 are patentable as well. All claims remaining in this application, therefore, are patentable.

This application is allowable in its present form for reasons discussed above. Reconsideration of the application is again respectfully requested. Should the Examiner have any questions after considering this amendment, the Examiner is invited to telephone the undersigned attorney.

Respectfully submitted,

Date: February 13, 2004

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